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Auditable Safety Analysis

for the

Test Reactor Area Research and Development Laboratories

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AUDITABLE SAFETY ANALYSIS

ASA-112

AUDITABLE SAFETY ANALYSIS FOR THE TEST REACTOR AREA RESEARCH AND DEVELOPMENT LABORATORIES

CONTENTS

FIGURE

TABLE

ACRONYMS

ASA	Auditable Safety Analysis
ATR	Advanced Test Reactor
BBWI	Bechtel BWXT Idaho, LLC.
CCA	Criticality Control Area
CFA	Central Facilities Area
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
ETRC	Engineering Test Reactor Critical
HEPA	high efficiency particulate air
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MCCA	Mass Criticality Control Area
MTR	Materials Test Reactor
NG	Neutron Gamma
OSH	Occupational Safety and Health
OSR	Operational Safety Requirement
PFN	Prompt Fission Neutron
PSAN	Plug Storage Area North
R&D	Research and Development
RCM	Radiological Control Manual
SSC	structures, systems, and components
TEDE	total effective dose equivalent
TPQ	Threshold Planning Quantity
TQ	threshold quantity
TRA	Test Reactor Area

E. EXECUTIVE SUMMARY

This Auditable Safety Analysis (ASA) provides the safety basis documentation for operational activities in the Research and Development (R&D) Laboratories at the Test Reactor Area (TRA). This ASA is applicable to the TRA R&D Laboratories for the operational lifetime of the facility and will remain in effect until the document is superceded, facility operations are terminated, or the facility operations are redefined.

E.1 Facility Overview

TRA-603, -604, -635, -654, -657, -661, -665, -668, and -690 comprise the R&D Laboratories. A brief description of each building is discussed in the following sections. The description identifies the laboratories housed in each facility. Although some of the buildings are joined, each was constructed at different times; thus, each structure has different characteristics. The TRA R&D laboratories are segmented into two zones in accordance with DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports."[1] Zone 1 comprises all the R&D laboratories excluding the ground story of TRA-665. The ground story of TRA-665 solely comprises Zone 2. The combination of facility features and the form of material precludes bringing material together or causing harmful interaction from a common severe phenomenon.

E.2 Facility Hazard Classification

The hazard classification of the TRA R&D Laboratories, is "Radiological, Low Hazard."[2] This document specifies the administrative controls to operate the facility within the radiological low criteria. TRA-666 and –666A, the Tritium Research Laboratory, have a separate safety bases document[3] and is not addressed in this hazard classification.

E.3 Safety Analysis Overview

This qualitative analysis is based on the radiological and chemical hazards presented by the TRA R&D Laboratories. This analysis has identified administrative controls to ensure the safety of the facility workers.

This analysis concludes that operation of the TRA R&D Laboratories is performed safely. This ASA will assure the necessary controls are in place to ensure the workers and the public are adequately protected during laboratory operation.

E.4 Organizations

Bechtel BWXT Idaho, LLC (BBWI) is responsible for operation of the TRA R&D Laboratories. The Idaho National Engineering and Environmental Laboratory (INEEL) fire department and the INEEL contractor organizations that provide maintenance, power distribution, and facility-related assistance will be the primary external support organizations for the facility. Independent consultants may provide other external support on a case-by-case basis.

E.5 ASA Organization

This is a graded ASA, meaning that the depth of the analysis is commensurate with the complexity and hazard classification of the TRA R&D Laboratories. U.S. Department of Energy Idaho Operations Office (DOE-ID) Order 420.D, "Requirements and Guidance for Safety Analysis,"[4] has been used to prepare this document. Additionally, DOE-ID guidance has been used to format this nonnuclear ASA into three chapters, rather than the 17-chapter format recommended in DOE-STD-3009-94,[5] "Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports," for nuclear

facilities. The seven analysis elements identified in DOE-ID 420.D, Attachment I, Item 2A, have been integrated into the three chapters as applicable. The three chapter titles are as follows:

1. Facility Description
2. Qualitative Hazard Analysis
3. Hazard Controls.

The seven elements to be considered, using the graded approach include the following topics:

a. A description of the facility; surrounding facilities which could have an impact on the safety analysis are discussed

b. A discussion of the hazard/accident analyses conducted for the facility

c. Applicable safety systems, structures, and components

d. Derivation of the operational safety requirements

e. Facility-specific hazardous material control, operational safety, emergency planning, or training, as applicable

f. Provisions for decontamination and decommissioning

g. Operational safety requirements, as applicable.

1. FACILITY DESCRIPTION

1.1 Site Characteristics

The Test Reactor Area (TRA) is located in the southern portion of the Idaho National Engineering and Environmental Laboratory (INEEL) west of the Idaho Nuclear Technology and Engineering Center (INTEC) and north of the Central Facilities Area (CFA). TRA is about 100 acres in size. TRA is approximately 10.6 km (6.6 mi) from the northwestern INEEL boundary and houses extensive facilities for studying effects of radiation on materials and fuels. The Advanced Test Reactor (ATR) is used for materials testing under reactor conditions and examination and processing of irradiated materials and isotopes (reference SAR-100).[6]

1.2 Facility Overview

TRA-603, -604, -635, -654, -657, -661, -665, -668, and -690 comprise the Research and Development (R&D) Laboratories. A brief description of each building is discussed in the following sections. The description identifies the laboratories housed in each facility. Although some of the buildings are joined, each was constructed at different times; thus, each structure has different characteristics. The TRA R&D laboratories are segmented into two zones in accordance with DOE-STD-1027.[1] Zone 1 comprises all the R&D laboratories excluding the ground story of TRA-665. The ground story of TRA-665 solely comprises Zone 2. The combination of facility features and the form of material precludes bringing material together or causing harmful interaction from a common severe phenomenon.

1.3 Process Description

Operations in the R&D Laboratories involve chemical research, routine chemistry, physics research, instrumentation research, computer applications, and radioactive material counting. These operations use chemicals and produce some chemically and radioactively contaminated materials. The analytical procedures and laboratory setups within the facility are typical of many analytical and research laboratories located in the private sector.

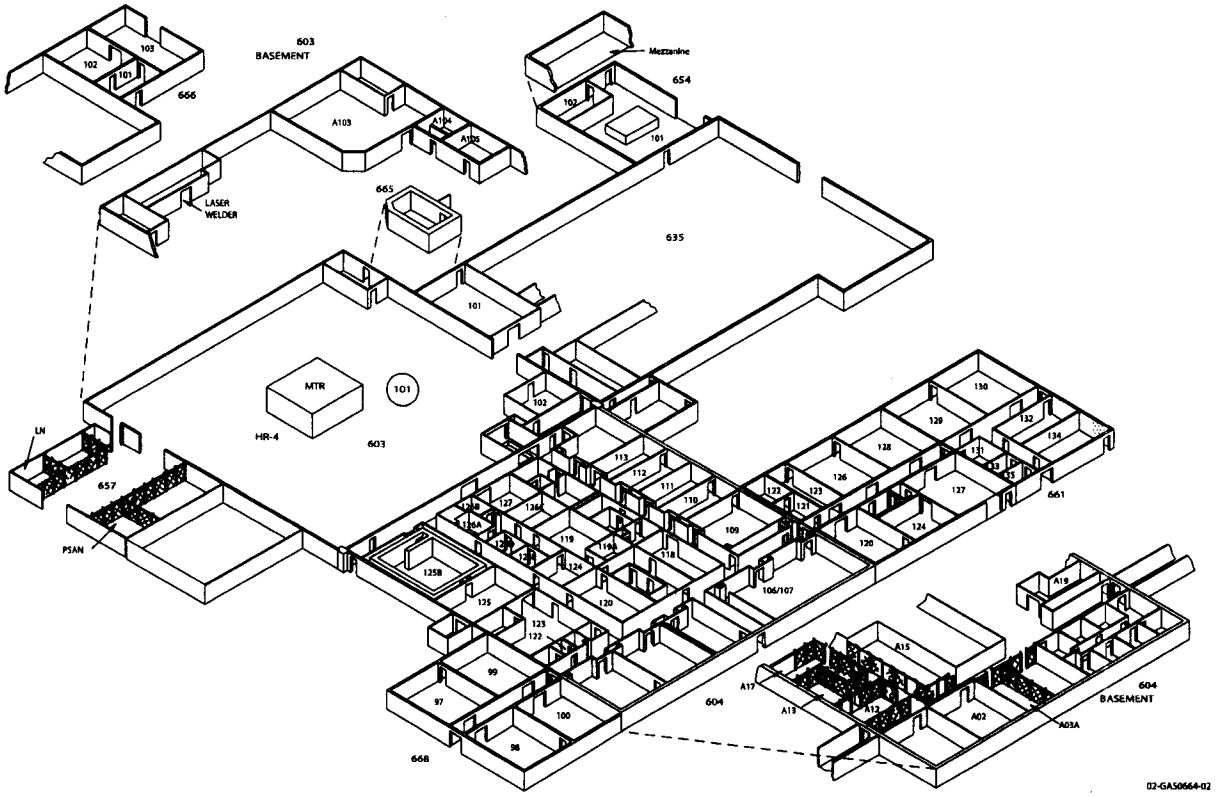

Figure 1. Schematic diagram of the TRA R&D laboratories.

1.3.1 TRA-603

TRA-603 is the Materials Test Reactor (MTR) building built in 1952. The MTR has been deactivated and isolated with the area surrounding the reactor used as storage and nonlaboratory functions. The building has a five-story high bay connected to a one-story portion with a basement that houses laboratories and offices. The roof is constructed of a built-up asphalt composition on top of poured concrete on steel trusses; the walls are constructed of poured concrete panels in concrete columns with a steel frame. The floor is reinforced concrete. The basement contains a canal, which was used for radioactive material and spent fuel storage (the MTR defueled reactor in TRA-603 also has a separate safety basis document[7] and is not addressed in this ASA). The building is equipped with a 30-ton capacity overhead crane. Several R&D laboratories and storage areas are located in TRA-603. There is one physics research laboratory located in Room 102. Rooms A104 and HR-4 are radioactive material storage areas and fissile material control areas. Room A105 is used for general storage.

1.3.2 TRA-604

TRA-604 is a one-story building with a basement and a partial second floor. The roof is constructed of an asphalt composition over poured concrete on steel beams with paper wrapped insulation. The ceilings are built of noncombustible tile and the walls are made from approximately 8-in-thick hollow core block. The floor is concrete, poured on steel beams and supported by steel columns. The second floor is concrete on a steel deck on steel beams. The partial second floor is used as office space and computer laboratory. TRA-604 was built in 1952. Laboratory 106/107 is used as a machine shop. A radiological control office is located in both Rooms 114 and 114A. Laboratories where chemistry experiments are performed are equipped with cold drains (no radioactive material is allowed down the drains) and warm drains (radioactive material is allowed down the drains). All laboratories where compressed gas cylinders are used are equipped with cylinder restraints. Standard 110 V power is available in all laboratories. In addition, some laboratories are equipped with 220 V and 480 V power. Radiation measurement laboratories and instrument development laboratories are equipped with nuclear counting equipment and computers, which control equipment and process data.

1.3.3 TRA-635

TRA-635 is a high bay building (equal to two stories) built in 1952 with a two-story area on the west side of the building. The roof is asphalt composition on poured concrete on steel joist beams supported by steel columns. The walls are constructed of hollow core block set in a steel frame. The floor is constructed of reinforced concrete. Laboratory 101 is located in TRA-635. Laboratory 101 is operated as a general physics laboratory and is used for experiment setup and calibration. It contains nuclear counting equipment and computer equipment used to process the experimental data. TRA-635 is a sprinkler-equipped building built from noncombustible materials. This building has controlled storage in an open area on the east side of the building, industrial waste segregation on the west side of the ground floor, and an office area located on the second floor of the west side of the building.

1.3.4 TRA-654

TRA-654 was originally built to house the Engineering Test Reactor Critical (ETRC) Facility. The ETRC was a nuclear mock-up of the Engineering Test Reactor. The ETRC has been removed and the building partially converted for laboratory purposes. TRA-654 is a high bay area. A balcony is installed at the east end of the facility. The roof is an asphalt composition on a metal deck above bar joists. The walls are constructed of approximately 8-in.-thick hollow core block. The floor is made of reinforced concrete. TRA-654 was constructed in 1959. The building has two laboratories, identified as Laboratories 101 and 102. Laboratory 101 is equipped with a 10-ton capacity traveling bridge crane. The former ETRC pit canal, which measures approximately 15 ft wide × 20 ft long × 17 ft deep, is located in Laboratory 101 at the center of TRA-654. Laboratory 102 houses a support laboratory with laboratory benches, a sink, and cabinets for glassware, and is located in the northeast corner of the building. TRA-654 houses 3 neutron generators each capable of producing a dose rate of approximately 935 mrem/h at one foot distance. The

deuterium and tritium used in these devices are metallically bound and not considered releasable. In addition to the neutron generators, the Radiation Physics organization received consent to operate and store two neutron generating probes in the former laboratory room inside the ETRC in TRA-654. The probes consist of a Prompt Fission Neutron (PFN) probe and Neutron Gamma (NG) probe. These probes produce neutrons through a deuterium tritium interaction. They contain small quantities of tritium, which is metallically bound and not considered releasable. The generator probes are sealed units and are stored in a storage tube whose end caps are maintained under lock and key. The Radiation Physics Organization is responsible for the operation and storage of these items. The probes support geophysics initiatives and environmental restoration programs at the INEEL. Both probes are capable of producing a dose rate of approximately 900 mrem/h at a distance of one foot.

1.3.5 TRA-657

TRA-657 was originally a plug storage building. It is adjacent to the north wall of TRA-603, which is the decommissioned MTR Reactor Building. The Plug Storage Area North (PSAN) is a cage occupying the northwest portion of the TRA-657. The one-story building is an approximately 50 ft × 60 ft (15.2 m × 18.3 m) sized pumice-block building with a roof height of approximately 18 ft (5.5 m) at the south wall, which slopes downwards to approximately 16 ft (4.5 m) at the north wall. The north wall contains a truck door, the size of which is approximately 14 ft × 13.7 ft (4.3 m × 4.2 m). The north wall also contains three windows and personnel double door. The east wall contains three windows and a double door for personnel access. The west wall is used as a retaining wall against a solid berm. The berm acts as shielding over the plug storage tubes. The west wall plug storage facilities consist of 21 cylindrical tubes, each of which are approximately 29 ft long × 10 in. in diameter and four box-shaped storage areas of various dimensions. The storage tube orifices that are through the west wall have faceplates made of 1/2-in. (1.3-cm)-thick-steel bolted to the wall. All 21 tubes and four box areas are approximately 29 ft long and are covered with at least 12 ft (3.7 m) of compacted soil acting as shielding. Chain link fencing is used to border the radioactive material storage areas, the 90-day storage area on the west side of the room, and also an area on the east side of the building designated as a liquid nitrogen dispensing area. Heat is supplied to TRA-657 by two large electrical space heaters, which are located on the north wall. The building is not sealed and has no specific ventilation system, fire suppression system, or pollution-control equipment. Eight suspended fixtures supply lighting. Electrical power is available in the facility at outlets along the walls. One fire extinguisher is located along the north wall. There are no floor drains in the PSAN or TRA-657. TRA-657 was also used to access the MTR canal for transporting fuel out of the canal to the Idaho Nuclear Technology and Engineering Center (INTEC). The fuel in the MTR canal and the plug storage area was removed in fiscal year 2002.[7]

1.3.6 TRA-661

TRA-661 radiochemistry wing is a one-story building made of approximately 8-in.-thick hollow core block with a utility tunnel. It is connected to TRA-604 with the main entrance to TRA-661 from the south side of TRA-604. TRA-661 is constructed in two sections: the northern half and the southern half. The northern half of TRA-661 was constructed in 1962. The roof is constructed on a steel deck set on steel beams supported by steel composition. The ceiling is comprised of fiberglass tiles set in metal "T" frames. The floor is made of reinforced concrete. The southern half of TRA-661 was constructed in 1987. It is also made of approximately 8-in. hollow-core block, but has a metal roof with insulation bats mounted to the underside of the metal. The make-up air to both sections of TRA-661 is filtered. The hood exhaust system for the north end of TRA-661, including the high-efficiency particulate air (HEPA) filters, is located in the TRA-604 fan loft. The exhaust draws the air out through the stack located on the west wall of TRA-603. The ventilation air for the south end of TRA-661 exhausts through the exhaust hoods and the HEPA filter bank located at the south end of the building. The exhaust stack is also located at the south end of the building; it is approximately 30 ft high (9.144 in.) and has a diameter of approximately 24 in. (60.96 cm).

1.3.7 TRA-665

TRA-665 is a 776 ft^2 two-story (the ground story, segmented from the rest of the facility and called Zone 2, is used for storage of radioactive sources and materials), single-room, reinforced concrete vault (the second story is connected to TRA-635 but is separated from the ground story of TRA-665). TRA-665 is located adjacent to the exterior walls of TRA-603 and TRA-635. There are no communicating openings between TRA-603 and TRA-665 or between TRA-635 and TRA-665. An exhaust vent goes directly from inside the vault to the atmosphere and does not vent into the upper portion of the building or into the other laboratories. There are no penetrations from the vault to any other building. The door to TRA-665 is an approximately 12-in.-thick steel door (the door opens to the outside and does not open into TRA-635). The floor is constructed of approximately 12-in.-thick concrete. The walls and ceiling (separating the ground story from the second story) are constructed of approximately 36-in.-thick concrete. The vault is used for storage of radioactive sources and materials.

1.3.8 TRA-668

TRA-668 is a one-story building with a utility tunnel. The roof is made of asphalt composition on a steel deck supported by steel beams. The walls are constructed of approximately 8-in.-thick hollow core block and the floor is reinforced concrete. TRA-668 is an extension to TRA-604. The four laboratories in TRA-668 are used for physics research and for instrument research and development. The rooms contain nuclear event electronic counting equipment, electronic test equipment, and computer equipment. A clean room is located in Laboratory 100. It occupies the southwest corner of TRA-668. It contains special inlet-filtered HEPA equipment used for experiments and engineering studies that require a clean environment. The laboratory contains workbenches and other specialized equipment.

1.3.9 TRA-690

TRA-690 is a single room metal shed on the east side of TRA-603. The robotics group uses it as a protective cover for a hydraulic power unit.

2. QUALITATIVE HAZARD ANALYSIS

2.1 Introduction

This chapter identifies and evaluates potential hazards associated with operation of the TRA R&D Laboratories. In addition, this chapter contains the qualitative consequences analysis of postulated representative and bounding TRA R&D Laboratories hazards.

2.2 Requirements

This chapter is based on the requirements presented in U.S. Department of Energy Idaho Operations Office (DOE-ID) Order 420.D."[4]

DOE-ID has established guidance for the consistent development of safety analyses for facilities at the INEEL. This guidance for the selection of safety structures, systems, and components (SSCs) and operational safety requirements (OSRs) has been employed in this analysis.

2.3 Hazard Analysis

2.3.1 Methodology

The methodology used to identify and evaluate potential hazards to the public, the workers, and the environment from operations in the TRA R&D Laboratories is contained in the following sections. Maximum dose or exposure consequences from postulated accident scenarios are used to determine if controls are necessary to prevent or mitigate the consequences of facility accidents.

2.3.1.1 Hazard Identification. A "hazard" as defined by DOE-STD-3009-94,[5] is a source of danger with potential to cause illness, injury, or death to personnel, or damage to an operation or the environment without regard for the likelihood or credibility of accident scenarios or consequence mitigation.

The hazards associated with the TRA R&D Laboratories are based on the radiological and chemical hazards.

The radiological and nonradiological inventory of the facility is presented in EDF-2687, "Test Reactor Area Research and Development Material Inventory for the Purpose of Hazard Classification."[8] The sum of the ratios for radiological material does not exceed 1. The chemical inventory does not exceed the 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals,"[9] threshold quantities or the 40 CFR 355, Appendix A,[10] threshold planning quantities (TPQs). Any chemical that exceeds the reportable quantity (RQ) specified in 40 CFR 302.4, "Designation, Reportable Quantities, ad Notification,"[11] is handled in accordance with INEEL procedures.

Table 1 of this document presents a checklist of generic hazards and their applicability to the operations of the TRA R&D Laboratories. This table also identifies the applicable U.S. Department of Energy (DOE)-prescribed occupational safety and health (OSH) standards corresponding with each hazard.

Table 1. TRA R&D Laboratories occupational hazard checklist.

Hazard	Applicable	DOE-Prescribed Program and OSH Standards
High Voltage (≥600 V)	No	N/A
Low Voltage (≤600 V)	Yes	29 CFR 1910, Subpart S; NFPA 70
High-Temperature Systems (≥125°F at contact or ≥203°F)	No	N/A
High-Pressure Systems (≥25 psig for gas or vapor or ≥200 psig for liquid)	No	N/A
Container Overpressurization	No	N/A
Cryogenic Systems	No	N/A
Low-Pressure Systems	No	N/A
Mechanical and Moving Equipment	Yes	29 CFR 1910.147, .211
Working at Heights	No	N/A
Excavation	No	N/A
Construction	No	N/A
Material Handling	Yes	29 CFR 1910, Subpart N; DOE-STD-1090-2001
Compressed Gases	Yes	29 CFR 1910.101, Subpart M
Combustible Materials	Yes	29 CFR 1910, Subpart L
Flammable Gases, Liquids, or Dusts	Yes	29 CFR 1910, Subpart H, .144, .1200
Pyrophoric Materials	No	N/A
Explosive Materials	No	N/A
Inadequate Illumination	No	N/A
Cryogens	No	N/A
Nonradioactive Hazardous Materials	No	N/A
Pesticide Use	No	N/A
Biological Agents	No	N/A
High Noise Levels	No	N/A
Inert or Low-Oxygen Atmospheres	No	N/A
High-Intensity Magnetic Fields	No	N/A
Nonionizing Radiation	No	N/A
Ionizing Radiation	Yes	10 CFR 835
Radioactive Materials	Yes	10 CFR 835
Fissile Materials	Yes	10 CFR 830
Temperature Extremes During Activities	No	N/A
Natural Phenomena	Yes	DOE Order 420.1, DOE G 420. 1-2

CFR Code of Federal Regulations
DOE U.S. Department of Energy
N/A not applicable
NFPA National Fire Protection Association
TRA Test Reactor Area

2.3.1.2 Hazard Evaluation. A qualitative hazard evaluation was performed for the TRA R&D Laboratories hazards that can result in unmitigated radiation and chemical exposure to workers. Each hazard was evaluated to determine potential exposure scenarios and their potential causes (HAD-166).[2]

2.3.2 Qualitative Hazard Analysis Results

The results of the qualitative hazard analyses are summarized in this section.

2.3.2.1 Radiological Inventory. The quantity of any radioactive materials used or stored in the TRA R&D Laboratories is less than the Hazard Category 3 threshold quantity values defined in DOE-STD-1027 and the sum of the ratios less than 1, thus, presenting no undue hazard to laboratory personnel.

2.3.2.2 Chemical Inventory. Quantities of materials in the inventory are limited such that no material quantities exceed the 29 CFR 1910.119 threshold quantities or 40 CFR 355 threshold planning quantities; thus, presenting no undue hazard to laboratory personnel.

2.3.2.3 Fissile Inventory. Fissile materials used or stored in the TRA R&D Laboratories are limited to mass criticality control areas (MCCAs). MCCAs are limited to no more than 350 g of U-235 or equivalent of fissile material.

2.3.2.4 Natural Phenomena Considerations. There are no natural phenomena hazard design requirements applicable to low-hazard facilities. The TRA R&D Laboratories were constructed in accordance with applicable national consensus codes, such as the Uniform Building Code.

2.3.2.5 Fire Hazards. The qualitative evaluation indicates that the consequences of an equipment fire in the facility are below regulatory requirements.

2.3.2.6 Ionizing Radiation. Potential doses from the neutron generators and probes are below the 2 rem criteria for radiation-producing devices.

2.4 Summary

2.4.1 Evaluation Results

This section summarizes the results of the qualitative hazard evaluation and identifies design requirements that are necessary to maintain risk to the worker and to members of the public below regulatory requirements.

2.4.1.1 Defense-in-Depth. The hazard evaluation results presented in the preceding sections demonstrate that the TRA R&D Laboratories are operated with a defense-in-depth approach that protects the public and the facility workers from the potential hazards of laboratory operations. Based on the results of the qualitative hazard evaluation, there are no safety SSCs required for protection of the worker. Administrative controls are assigned in Chapter 3.

2.4.1.2 Worker Safety. Although no safety SSCs have been identified, additional features that help ensure worker safety at the TRA R&D Laboratories include management procedures, operating procedures, reviews and audits, emergency preparedness procedures, configuration management, measuring and test equipment, quality assurance, occurrence reporting and lessons learned, qualification and training, operating records procedures, and safety management programs, such as conduct of operations and waste management, required by DOE regulations.

2.4.1.3 Provisions for Decontamination and Decommissioning. Upon reaching the end of its operating life, a decision will be made regarding whether the facility will continue serving as laboratories or will be decontaminated and decommissioned (D&D). At that time, if the decision is made to D&D, a facility transition plan will be developed to prepare the facility for the appropriate closure activities.

3. HAZARD CONTROLS

3.1 Introduction

This chapter provides a discussion of the controls intended to ensure safe operation of the TRA R&D Laboratories. These features have been derived from the qualitative hazard and accident analyses presented in Chapter 2 of this document.

3.2 Operational Safety Requirements

OSRs are not applicable to low-hazard facilities. The TRA R&D Laboratories have been classified as "Radiological, Low Hazard;" therefore, OSRs are not required.

3.3 Administrative Requirements

3.3.1 Radionuclide Inventory

The TRA R&D Laboratories shall maintain the total radionuclide inventory sum of the ratios for DOE-STD-1027-92[1] Category 3 thresholds to less than 1 in each zone.

3.3.1.1 Potential Radiation Exposure. Potential personnel radiation exposure from sealed radioactive sources, radiation-producing devices, or nonreleasable radioactive material shall be limited to less than 2 rem TEDE from any single event, through training, procedures, and the Radiation Protection Program.

3.3.2 Control of Fissile Material

TRA R&D criticality control areas (CCAs) shall be controlled in accordance with an Institutional Criticality Control Program. Only MCCAs are allowed for the control, storage, and handling of fissile materials. MCCAs are limited to no more than 350 g U-235 or equivalent of fissile material

3.3.3 Chemical Inventory

The TRA R&D Laboratories shall maintain the inventory of hazardous chemicals less than the 29 CFR 1910.119 threshold quantities and the 40 CFR 355 threshold planning quantities in each zone.

3.4 References

1. DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports," Change 1, U.S. Department of Energy, September 1997.

2. HAD-166, "Test Reactor Area Research and Development Laboratories Hazard Classification," Rev. 0, Submitted to DOE November 19, 2002.

3. HAD-179, "The Safety and Tritium Applied Research Facility Hazard Classification," Rev. 0, July 8, 2002.

4. DOE Order 420.D, "Requirements and Guidance for Safety Analysis," U.S. Department of Energy Idaho Operations Office, July 2000.

5. DOE-STD-3009-94, "Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports," U.S. Department of Energy, July 1994.

6. SAR-100, "INEEL Standardized Safety Analysis Report (SAR) Chapters," June 27, 2000.

7. HAD-220, "Hazard Categorization for Material Test Reactor Canal and TRA-657 Plug Storage Holes 1 & 2, TTAF, and MTR Vault No. 1," Rev. 0, Draft.

8. EDF-2687, "Test Reactor Area Research and Development Material Inventory for the Purpose of Hazard Classification," Rev. 0, Date TBD.

9. 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1998.

10. 40 CFR 355, Appendix A, "The List of Extremely Hazardous Substances and Their Threshold Planning Quantities," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.

11. 40 CFR 302.4, "Designation, Reportable Quantities, and Notification," *Code of Federal Regulations*, Office of the Federal Register, April 1985.